KNOWLEDGE

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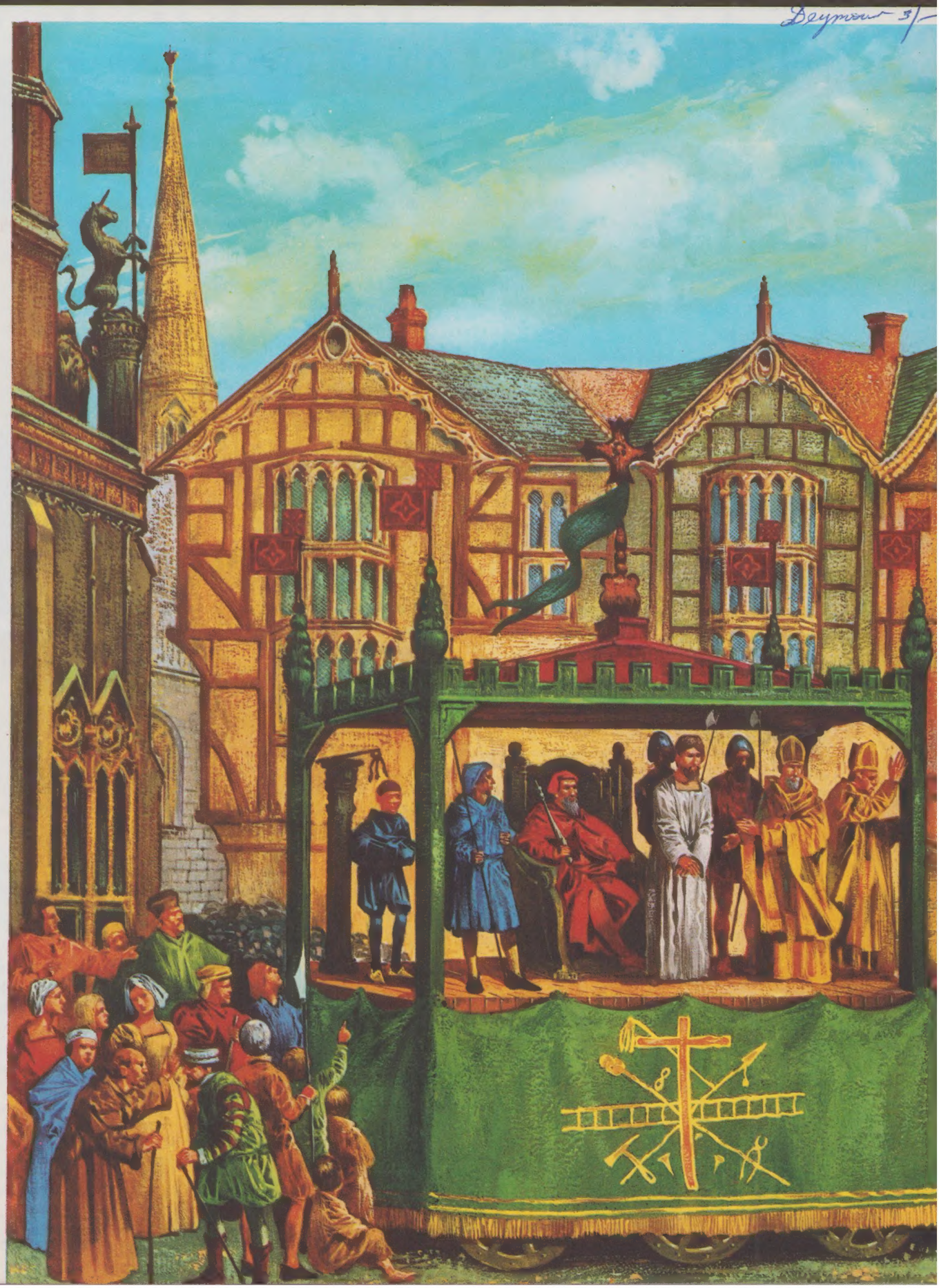

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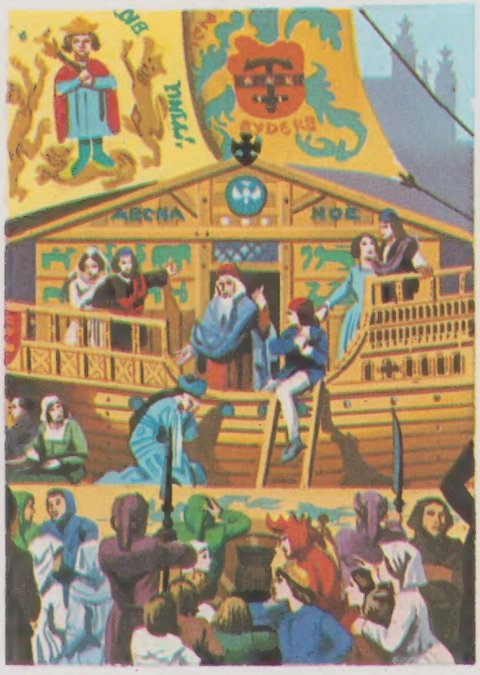
THEATRE (part two)



A mediaeval Miracle play about one of the most popular biblical stories, Noah's Ark

THE theatre virtually disappeared in Europe after the fall of the Roman Empire. The next five centuries saw the eclipse of Roman and Greek culture. It was not until the 13th century that the dramatic arts were revived. As with the early Greek plays, the plays of the Middle Ages developed as parts of religious ceremonial. They were called Miracle or Mystery plays. Most probably they began as simple performances by monks or choirboys, who might, during the Easter celebrations, act such scenes as the meeting of the angel and the two Marys outside Christ's empty tomb.

Gradually more and more episodes from Christ's life were acted, and the stories became more dramatic. The use of English became more common than that of Latin; at that time the Bible was written in Latin, so the acting of Bible stories in English must have been very exciting for the ordinary people. By the 14th century these simple scenes had developed into little plays which were often performed in the church porch. The monks were probably still writing the plays, but by this time the actors were often laymen. In 1210 the Pope forbade the clergy to act, perhaps because there was a danger that the monks would get too proud of their ability.

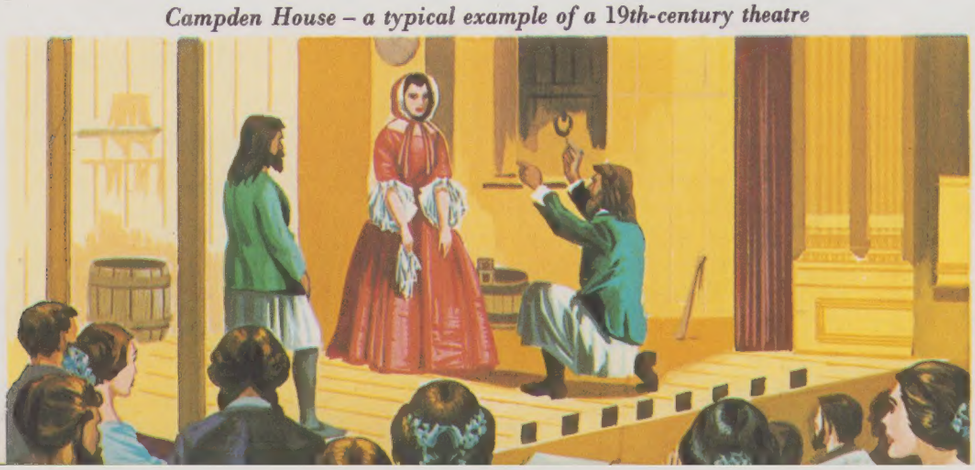
Soon the great mediaeval Craft Guilds began to produce plays. Each Guild had its own special subject; the boat builders might produce a play about the building of the ark, or the wine sellers would act the wedding feast in which Christ turned the water into wine. On the whole, ordinary people played the parts of God and the Saints, but sometimes the Guilds made use of professional bands of wandering players who toured the castles and market-places of Britain.

Each important town would have its own cycle of plays: a series which covered the biblical story from the Creation to the Last Judgement. The great feast of Corpus Christi was one of the most popular times for performances. The 'theatre' used was a double-decker wagon called a pageant. On top was the stage, and below this the dressing room. Performances started at dawn, and went on until dusk. The wagon would make a series of stops, each time acting for a different audience. The Guilds took their plays very seriously, and tried to outdo each other. Costumes were elaborate and the scenery was often ingenious. 'Hell's mouth' belched out real flames, and angels 'flew' down from 'heaven' aided by elaborate flying machines. The Mystery and Miracle plays must have made the Bible stories seem very real to ordinary people. The actors wore contemporary clothing, and Noah's wife used the same rough, everyday language as the audience.

Today you can see a performance of a complete cycle of Miracle plays at York. They are performed there every summer.

A scene from Richard Sheridan's famous play, The School for Scandal, *produced in* 1777

Campden House – a typical example of a 19th-century theatre



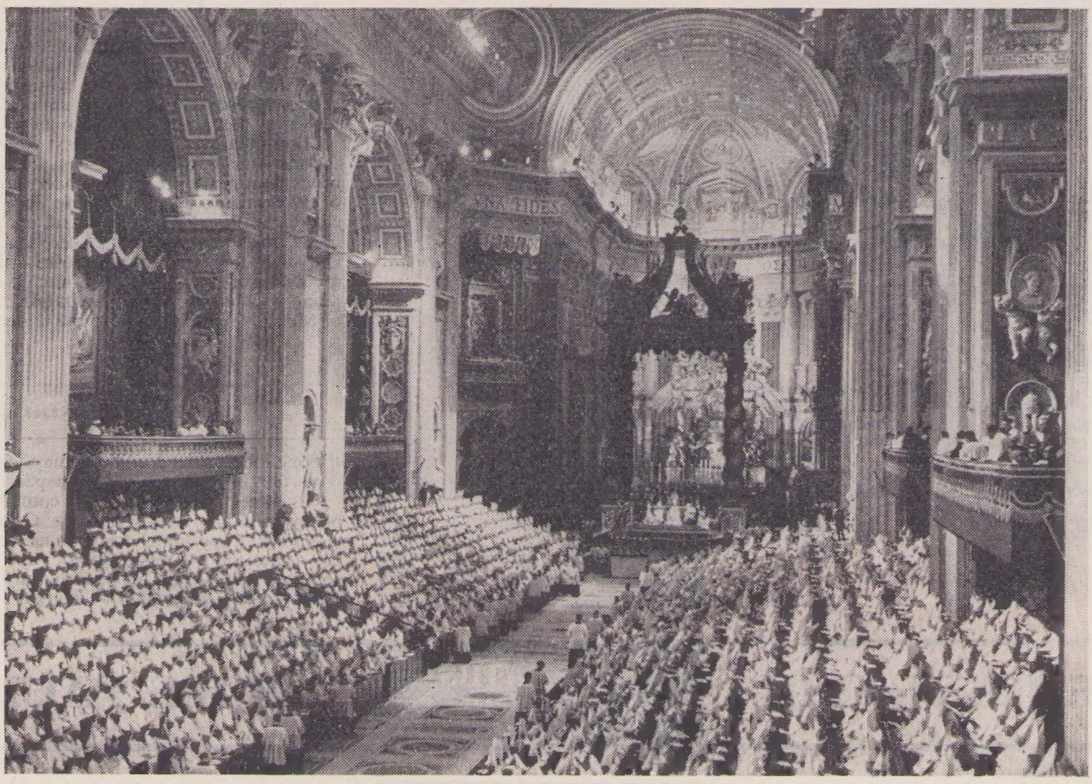
Morality plays

Morality plays became popular in England in the 15th century. While Miracle and Mystery plays told men about supernatural events, the Morality play was concerned with how man should behave himself in this life. Virtues and vices were represented by amateur or professional actors. The hero, who is often an ordinary man, stands between Virtue and Vice, who fight a long and intensive battle for his soul. One famous Morality play is called *Everyman*. A German version of this play is still performed each year in Salzburg.

Previous page: A pageant vehicle and play in mediaeval Coventry.

KNOWLEDGE NEWS
Week beginning 4th August 1963

THE SPACE AGE PAPACY



Inside St Peter's during the General (Ecumenical) Council summoned by Pope John. The Council was attended by over 2,600 bishops from all over the world.

ON the morning of Friday, June 21st, a huge crowd had gathered in St Peter's Square. Suddenly smoke began to pour from the chimney of the Sistine chapel where the cardinals had been in conclave, completely sealed from the outside world. It was white smoke. This meant that a new Pope had been elected. Soon afterwards Cardinal Alfredo Ottaviani, Secretary of the Sacred Congregation of Holy Office, appeared on the central balcony of St Peter's. 'I announce to you tidings of great joy,' he intoned in Latin. 'We have a Pope. He is the most eminent and most reverend Lord Cardinal Giovanni Battista . . .' Before Ottaviani could finish the crowd were shouting the name: 'Montini, Montini!'

The favourite wins

The result of the papal election surprised no one. Montini had been a friend of Pope John XXIII, and he held many of the previous Pope's views, while being respected by a number of more moderate churchmen. But quite often in papal elections the 'favourite' is not elected. There is a saying that 'he who goes into the conclave a Pope comes out a cardinal'. This did not happen in Montini's case.

Montini has become Pope Paul VI at a time when the papacy is more popular and respected throughout the world than at any time in the last 400 years. The two previous Popes, Pius XII and John XXIII, have done much to achieve this. But the tremendous popularity probably owes more to the late Pope John XXIII.

When John became Pope in 1958, he soon startled Italy and the world. He was a very different sort of Pope to his predecessor, Pope Pius XII. Pius was tremendously dignified, aloof, and awe-inspiring, born into an aristocratic family.

Pope Paul VI during his coronation ceremony.

John has been the most popular name for Popes. There have been twenty-three Johns, sixteen Gregorys, fourteen Clements, and thirteen Leos.

John, from a simple farming family, was friendly and down-to-earth.

One of his first acts was to visit the prisons of Rome, and he soon showed that he meant to dispense with much of the pomp and ceremony that had surrounded Pius XII. But more changes were to come. John wanted the papacy to play a more positive role in world affairs. He wanted the successor of St Peter to adapt himself to the space age. He saw that there were great problems in the world, and the Pope, in Roman Catholic eyes the Vicar of Christ on this earth, should be in the forefront in trying to solve them.

World problems

The greatest of these problems, in Pope John's eyes, was the need to gain a lasting peace. But there were also the problems of the family, poverty, social injustice, underdeveloped nations and religious liberty. With all these in mind Pope John summoned a General Council of the Church. It met in 1962, but the first session ended without anything spectacular being accomplished.

Among the cardinals there was a conservative element in opposition to the Pope. They had a much more traditional view of the Church than Pope John. They disapproved of some of his more liberal ideas, especially his 'softer' attitude towards Communist countries. The leader of the conservatives was Cardinal Ottaviani.

Much has been made of the split between the conservatives and the liberals in the Vatican. Pope John was indeed a liberal, but his beliefs were just the same as those of the conservatives – he merely stressed different things. He never for one moment suggested that the Roman Catholic Church was not the *only* true Church. But he *did* constantly point out that good Christians could be found inside and outside it.

[*continued on page 2*

THE SPACE AGE PAPACY *(continued)*

Cardinals in procession during Pope John's General Council. It was the first General Council for 92 years

* * *

(Above) Cardinal Bea, appointed by Pope John to promote Church unity. (Left) Pope Pius XII. (Right) Pope John XXIII with Britain's Queen Elizabeth II.

* * *

The Christian, he constantly reminded people, is known by his actions. To the Mayor and the Council of Venice he said: 'The only way to be a Christian is by doing good. Thus I am happy to be in this house even though there may be some here who do not call themselves Christians – but who can be acknowledged as such on account of their good deeds. To all I give my paternal blessing – to all without distinction.'

His sympathy and friendliness to all Christians meant that the movement for Church unity became an important part of his pontificate. He set up, under Cardinal Bea, the Council of the Secretariat for Promoting Christian Unity. The Anglican Archbishop Fisher of Canterbury he received with friendliness. John was very much aware that there were millions of Christians in Communist countries – many of whom followed the belief of the Orthodox Church, which was not in communion with Rome. At his invitation, the Orthodox Patriarch of Moscow sent observers to the General Council.

A significant Pope

Pope John's brief pontificate may have been one of the most important in the history of the papacy.

His successor, Paul VI, seems committed to carrying on his policy and has reconvened the General Council. He has also said: 'Pope John has shown us some paths which it will be wise to follow. Death cannot stifle the spirit which he so enthused in our era. Can we turn away from paths so masterfully traced? It seems that we cannot.'

POPE JOHN XXIII

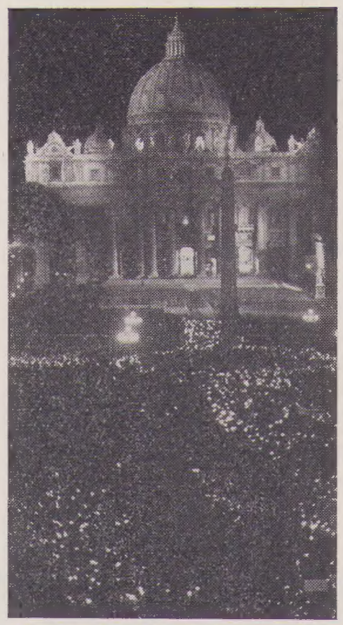
ANGELO GIUSEPPE RONCALLI was born in 1881. He was the third of 13 children. He described his family in these words: 'We were poor but happy. We were not aware of lacking anything; in fact we lacked nothing. We lived in honest, cheerful poverty.'

The future Pope went first to the village school. But when only 10 he entered the minor seminary at Bergamo. So his ecclesiastical career started early. In 1904 he was ordained priest, and in 1905 he began work as secretary to the Bishop of Bergamo. He gained considerable experience in pastoral work, and the Bishop, Giacomo Radini Tedeschi, influenced him greatly. In 1921 he was called to Rome, and in 1925 was given the post of Apostolic Visitor to Bulgaria, the first papal representative there since the 13th century. Archbishop Roncalli, as he now was, succeeded in establishing friendly relations with the Orthodox Church there, and in 1934 he was appointed Apostolic Delegate to both Turkey and Greece, which had large congregations of Orthodox Christians. It is probable that his diplomatic career in eastern Europe gave him an interest in the Orthodox Church, which can be seen clearly in his acts while he was Pope. In 1944 he was appointed Papal Nuncio in Paris, and came into contact with the 'worker priest' movement. In 1952 he became the first permanent observer of the Holy See in UNESCO.

In 1953 Angelo Roncalli was made a cardinal, and three days later was appointed Patriarch of Venice. As Patriarch, as well as Pope, he showed that the Church was prepared to adapt itself to the age; in fact, he startled some people by celebrating Mass for the International Film Festival.

In 1958 he was elected Pope John XXIII.

TWO PATHS TO ROME



Crowds outside St Peter's after the first day of the General Council.

Letter from the Editor-in-Chief is on page 4

POPE PAUL VI

GIOVANNI BATTISTA MONTINI'S father was a fairly well-to-do lawyer and journalist. Giovanni Battista was a frail child and was educated privately. At the age of 20 he entered the Jesuit school at Brescia. A classmate of his there said of him: 'Never have I met anyone who had to say so little to establish his authority.'

In 1920 he was ordained a priest, and after a brief spell as secretary to the Apostolic Nuncio in Warsaw worked in the Papal Secretariat of State. In 1933 his promise was noticed by the Secretary of State, Cardinal Eugenio Pacelli, who said of Montini to a friend: 'I like that intense young man.' In 1937 Giovanni Battista was appointed Substitute Secretary of State for Foreign Affairs. In 1939 Eugenio Pacelli became Pope Pius XII, and relied more and more on Montini, who grew increasingly important in the papal civil service. However, towards the end of Pope Pius's life Montini's more liberal views clashed occasionally with the more conservative ones of the Pope.

Archbishop of Milan

In 1954, however, he was appointed Archbishop of Milan. He became known as the 'workers' Archbishop', even though he remained friendly with the business community. He made a good impression in Milan, and soon after Angelo Roncalli became Pope he made Montini a cardinal. Pope John and Montini became firm allies and friends, and it became obvious to many that Pope John regarded Montini as his heir apparent. His character is different to that of Pope John. He has been described as a mixture of Pius and John: Pius for his dignity, holiness and learning, and John for his advanced and liberal views.

One of the ways in which the helicopter has proved itself invaluable: the rescue of shipwrecked men from the sea in the height of a storm

HELICOPTERS

INJURED man lifted to hospital by helicopter'; 'Food dropped to farm cut off by drifts'; these are typical newspaper headlines. Helicopters seem to have invaded every part of our lives. They take part in dramatic rescues at sea, they spray crops in our fields, they carry members of the royal family on short journeys, and they even lift spires into place on churches.

These little machines can take off, climb, descend, and land vertically, and can hover steadily in mid-air, quite unlike ordinary aircraft. They have been in general use only during the last 25 years, but they are familiar to all of us, with their great airscrews whirling above flimsy bodies. How do these extraordinary machines work?

How the helicopter works

The name helicopter comes from two Greek words, *helix*, a screw, and *pteron*, a wing: the machine with the screw-wing. This describes it very well, for the outstanding characteristic of the helicopter is the airscrew, or rotor, which keeps it in the air by whirling round and round. This takes the place of the wings of normal aeroplanes. The blades of the rotor are in fact long narrow wings, which provide lift irrespective of the speed of the helicopter itself, as long as they keep moving.

The rotor may have two, three, four, or more blades. Sometimes a helicopter has two main rotors, but more usually it has one main rotor, and a small non-lifting tail rotor.

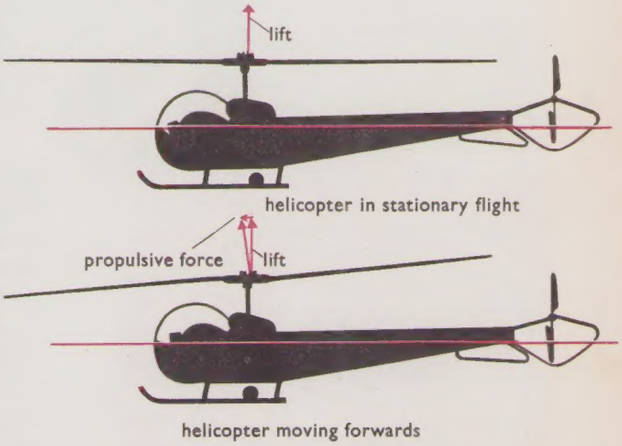
The main rotors are driven by one or more petrol or gas turbine engines, and rotate horizontally above the helicopter. The moving blades provide lift for the machine in exactly the same way as the wings of a conventional aeroplane in flight.

The propeller of an aeroplane, rotating in a vertical plane in front of the machine, pulls it along. The main purpose of the helicopter's rotor is to provide lifting power, but it also propels the aircraft forwards through the air, and enables the pilot to control the course of his machine in flight.

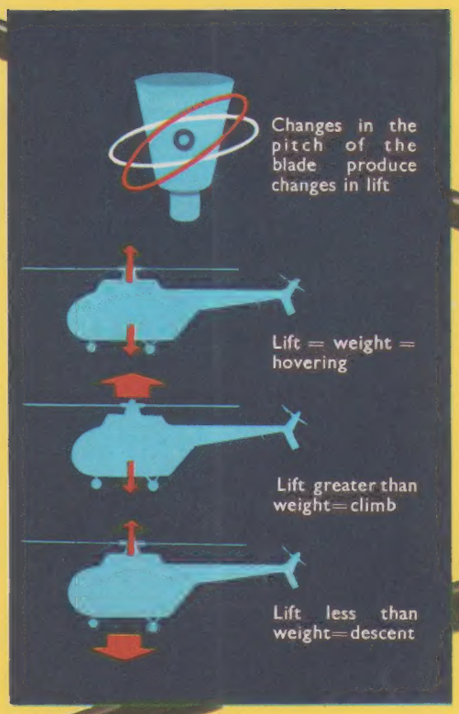
Ascending and descending

The ability of the helicopter to move up and down through the air depends upon the lifting power of the rotor. When this is greater than the weight of the helicopter the machine will rise; when it balances the weight the machine will remain stationary in the air; when it is less the machine will descend.

The lifting power depends on the angle of the blades of the rotor, and on the power transmitted to the rotor by the engine. The angle of the rotor blades and the power taken from the engine must, in fact, be closely related; if the angle of the blades is increased by the pilot more power is required to turn the rotor, and *vice versa*. This relationship is achieved by an automatic connection between the engine throttle and the collective pitch control, a lever by which the pilot can alter at the same time the angles at which all the blades are attached to the hub of the rotor.



Helicopter hovering (above) and moving forwards; notice the alteration in the plane of the rotor


Changes in the pitch of the blade produce changes in lift
Lift = weight = hovering
Lift greater than weight = climb
Lift less than weight = descent

HOW THE HELICOPTER IS STEERED

How does a helicopter move forwards, sideways, or backwards? This is done by tilting the plane of rotation of the main rotor or rotors. The pilot's control column (the 'cyclic pitch control') enables him to vary the angle each individual blade of the rotor makes in the air as it rotates. In this way the direction of the lift of the rotor can be inclined slightly forwards, sideways, or backwards. Once a helicopter starts moving, the plane of rotation of the rotors stays tilted in the direction of motion until the pilot changes it again. This is why helicopters often have a nose-down look when they are seen flying at speed.

rotor blade
rotor control linkage
rotor head
main transmission shaft
tail rotor transmission
500-horsepower motor
rear fuel tank
air intakers
instrument panel
glass-enclosed pilot's cabin
passenger cabin
front fuel tank
pilot's controls
nose wheel
control runs
navigation light
exhaust pipe
undercarriage leg
undercarriage shock absorber

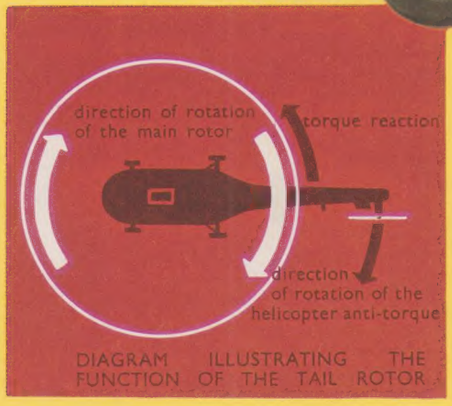


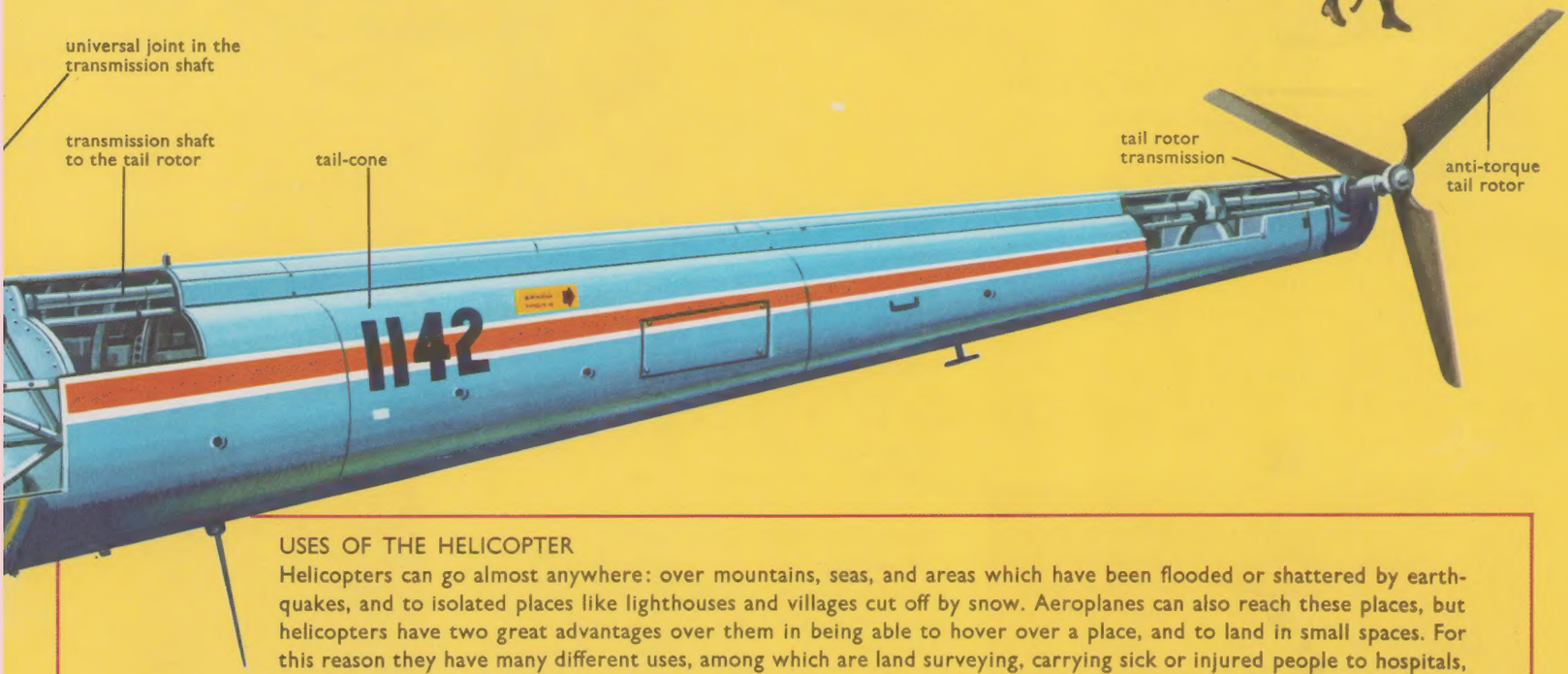
DIAGRAM ILLUSTRATING THE FUNCTION OF THE TAIL ROTOR

ANTI-TORQUE TAIL ROTOR

When a rotor or propeller is driven by an engine, a reaction takes place which tends to make the whole aircraft rotate in the opposite direction. To avoid this effect, which technicians call 'torque reaction', helicopters are designed either with two main rotors turning in opposite directions, and thus balancing each other, or with a small vertically-mounted tail rotor which counteracts the torque of the main rotor. The latter type is now the most common, but twin-rotor helicopters are also widely used. With the most popular single-main-rotor type of helicopter, the small anti-torque rotor has the angle of its blades controlled by the pilot's foot pedals. The pilot can therefore increase or reduce the thrust of the tail rotor at will, and in this way swing the helicopter's tail in order to steer his craft or, if required, even rotate it about its own axis. Twin-rotor helicopters are steered by differentiated tilting of the two rotors.

One of the largest and one of the smallest helicopters: the Piasecki XH-16, which was able to carry 45 people, and the Rotorcraft Pinwheel, designed to carry one man

GENERAL VIEW OF A HELICOPTER WITH ILLUSTRATION OF INTERNAL STRUCTURE



USES OF THE HELICOPTER

Helicopters can go almost anywhere: over mountains, seas, and areas which have been flooded or shattered by earthquakes, and to isolated places like lighthouses and villages cut off by snow. Aeroplanes can also reach these places, but helicopters have two great advantages over them in being able to hover over a place, and to land in small spaces. For this reason they have many different uses, among which are land surveying, carrying sick or injured people to hospitals, spraying crops with insecticides, taking supplies to isolated houses, villages, and lighthouses, and inspecting forests to check against fires, and areas where there is danger of avalanches.

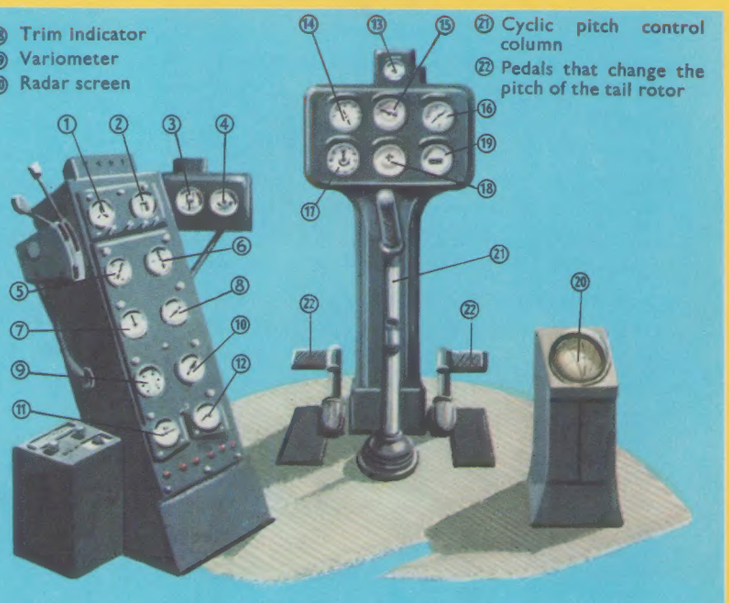
DISADVANTAGES

Helicopters can do many things which other aircraft cannot, but they also have disadvantages. They are expensive to buy and need very careful maintenance. They are more difficult to fly than conventional aeroplanes of the same weight and capacity, and need more powerful engines to carry the same load. The higher power needed by the helicopter means that it uses more fuel than an equivalent aeroplane. This means that it is more expensive to operate.

Helicopters usually have a shorter range than aeroplanes. They are also slower (most of them cruise at speeds of up to 100 m p h), and they are noisy, both to their occupants and to people on the ground. But despite these disadvantages helicopters have proved themselves invaluable.

INSTRUMENT PANEL OF A HELICOPTER

① Fuel
② Switch
③ Compass
④ Trim indicator
⑤ Tachometer
⑥ Air speed indicator
⑦ Boost gauge
⑧ Altimeter
⑨ Thermometer
⑩ Oil pressure indicator
⑪ Thermometer showing the temperature of cylinders
⑫ Ammeter
⑬ Compass
⑭ Fuel pressure gauge
⑮ Turn and slip indicator
⑯ Tachometer
⑰ Air speed indicator
⑱ Trim indicator
⑲ Variometer
⑳ Radar screen
㉑ Cyclic pitch control column
㉒ Pedals that change the pitch of the tail rotor



WORLD MINING

THE areas in which mining takes place are very unevenly distributed over the earth's surface. There are two main reasons. In the first place there are parts of the world almost devoid of mineral resources, and, secondly, even in places where deposits are known to exist they have not been exploited because the inhabitants have no use for them. Coal, for example, is found in many countries, although in parts of China huge deposits lay unused until comparatively recently. There are places like Scandinavia and north-west Scotland, which are composed of ancient rocks, where coal is not found at all – this is because the plants from which coal is formed were not growing on earth at the time when the rocks were laid down.

There are still large areas of the world which have not been properly explored for minerals. Indeed, the first workable oil deposits to be found in Australia were located in Queensland as recently as 1962. Man must have some use for a particular mineral before he will attempt to mine it on a large scale. Today uranium is being mined on a vast scale in many countries because it is essential for the production of atomic energy.

Opencast mining of the iron ores of the Mesabi Range to the west of Lake Superior
NORTH AMERICA
Gulf of Mexico
Oil wells along the Gulf of Mexico
PACIFIC OCEAN
ATLANTIC
VENEZUELA
SOUTH AMERICA
The opencast copper mine at Chuquicamata in Chile

THE UNITED STATES

The United States is blessed with abundant raw materials, and being a highly developed industrial nation these resources are not neglected. The United States mines 391 million tons of hard coal a year, and is the world's largest producer, although if poor quality lignite is included both Russia and China exceed the United States output. Pennsylvania is the chief source of American coal. There, the seams are thick, and over 300 million tons a year are produced. The United States leads in the production of petroleum, with an annual output of 353 million tons, out of a world production of 1,056 million tons. Most of the oil wells are in the central lowlands from Kansas south to the Gulf Coast, but California is also a large producer. The vast United States iron and steel industry is fed largely with iron ore from the Mesabi Range, which is to the west of Lake Superior. Special boats carry it across the Great Lakes towards the Pennsylvanian coal. The United States mines 48 million tons of iron ore (iron content) annually out of a world total of 226 million tons. Although Russia now mines considerably more iron ore, the United States still leads in the production of wrought iron and steel.

THE SOVIET UNION

The Soviet Union covers a sixth of the world's land surface, and is rich in mineral deposits. During the last 50 years its industries have grown very rapidly, and the raw materials needed to supply them are almost all found within the country. 375 million tons of hard coal and 138 million tons of lignite are produced each year. The combined total of 513 million tons is the largest in the world, and is nearly a fifth of the world's output of 2,627 million tons. Coal production is much more scattered in Russia than in the United States. The most productive area is the Donets basin, which is one of the oldest centres of coal production in Russia. It now accounts for 37 per cent of the total output. The Kuznetz basin produces 15 per cent and the Urals 12 per cent. Oil production has risen very rapidly in Russia, having doubled over the last five years. With an output of 166 million tons, the Soviet Union comes second after the United States. Venezuela is third.

Russia is the world's leading country in the production of iron ore. Over 61 million tons (iron content) are produced. This is more than a quarter of the world's output. Russia also leads in the production of manganese, with 2,600,000 tons out of a total of 5,300,000 tons.

A LAKE OF PETROLEUM

Petroleum is trapped inside sedimentary rocks, and is normally found in lowlands. Sometimes, just like coal, the valuable deposits of this oil lie under the sea. Coal is obtained by extending the underground galleries beneath the sea, but when underwater oil deposits occur, oil wells can actually be drilled. Lake Maracaibo, in Venezuela, is an extraordinary sight, with its forest of derricks sticking straight out of the water.

MALAYAN TIN

Once Cornwall was an important source of tin, but now Malaya, with an annual production of 51,000 tons, supplies a third of the world's needs.

THE WEALTH OF THE CONGO

The Congo has long been noted for its mineral wealth. The Kasai area is famous for its diamonds, and half the world production comes from there. The Congo stands fifth in the output of copper, and has recently become extremely important for its production of uranium.

THE PERSIAN GULF

The Persian Gulf is renowned for its petroleum production, and practically all of it is exported. Kuwait is the leading producer of this region, with 81 million tons a year, followed by Saudi Arabia with 62 million, Iraq with 52 million, and Iran with 47 million tons.

SOUTH AFRICAN GOLD

South Africa produces nearly half the world's gold – 21 million ounces a year. World output has increased by about a third in the last decade, and practically the whole of this increase is due to South Africa. Most of the gold in South Africa comes from one area, the Witwatersrand, which has given rise to the great city of Johannesburg. In recent years new deposits have been discovered, and at least three major mining areas have been developed, so that production is likely to remain high.

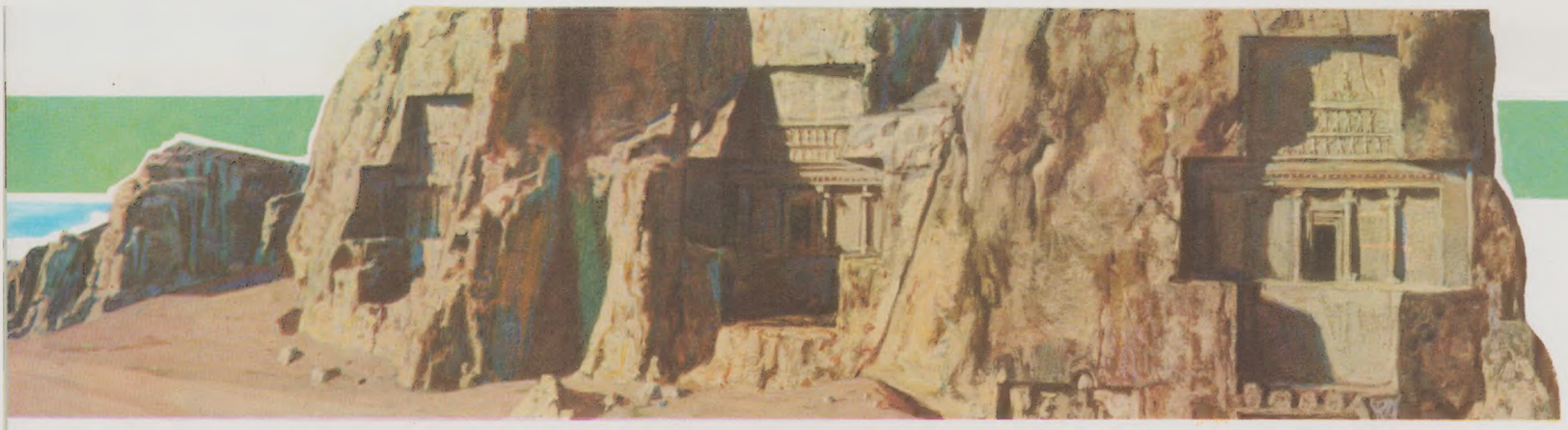
CHILE

Chile is the world's third largest copper producer with an annual output of 531 million tons. Some mines are very large, such as that at Chuquicamata, which is 10,435 feet above sea level. Chile produces a variety of other minerals, but its only major mining industry apart from copper is molybdenum, of which it produces 2,000 tons a year.

BAUXITE IN JAMAICA

The production of bauxite on a large scale in Jamaica is a recent development. In 1952 Jamaica was the seventh largest producer in the world with an output of only 420,000 tons. Now it is the world's most important single source of bauxite with an annual output of 5,800,000 tons, nearly a quarter of the world production of 24 million tons.

Note: Most figures are given in metric tons, for the year 1960.



The tombs of the Persian kings at Nakshi-i-Rustum near Persepolis. On the right is the tomb of Darius the Great

MODERN Persians call their country Iran, a word which comes from 'Aryan', the name given to the first people we know to have lived there. In early times Iran was divided into two parts. In the south-west was Ancient Persia, a country of mountains and deserts, with isolated fertile valleys in which grazing and crop cultivation were possible. To the north of Ancient Persia lay the rival kingdom of the Medes, a country with a large empire which they had conquered from the Assyrians.

Cyrus the Great

About 550 B C Cyrus, the first king of Ancient Persia, captured Astyages, King of Media, and eventually assumed control of the Median Empire. At that time the Persians had two great enemies, the Lydians in the west and the Babylonians to the south. Lydia lay in what is today western Turkey. In 550 B C it stood between the growing Persian Empire and Greece. If Cyrus could capture Lydia, the way lay open for him to conquer Greece. In 546 B C he defeated Lydia's king, Croesus, and Lydia with its Greek colonies came under Persian rule. Croesus was one of the richest kings of the ancient world and his country contained many gold mines. Today we sometimes describe a person as being as 'rich as Croesus'.

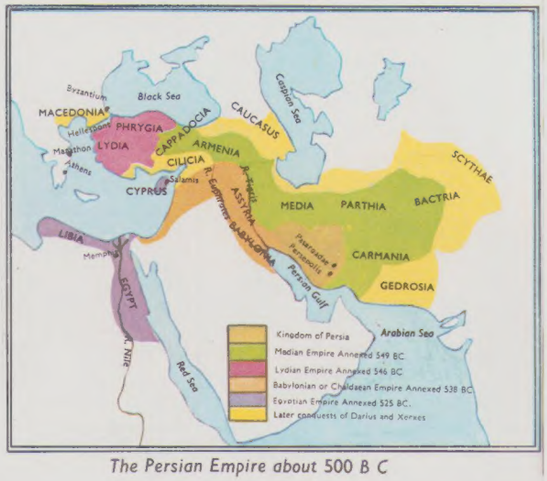
Cyrus's dream was to conquer Babylonia, even though people said that Babylon was unconquerable and contained enough food to withstand a siege for 20 years. It was in the year 539 B C that Cyrus marched towards the impenetrable city. One night while the citizens were feasting Cyrus led some of his men a short distance up the river Euphrates. They had a brilliant plan. They broke down the river bank and diverted the river from its route into a nearby depression. The river ceased to flow past this point, and his men were able to creep along the dry river bed into the city and took it completely by surprise. Too late, the ruler Belshazzar saw the 'writing on the wall' which foretold the conquest of his country (*Daniel* 5: 25–31). The inhabitants of the country were treated leniently and many Jewish slaves in Babylon were allowed to return to Palestine. Cyrus was hailed as 'king of the world, king of Babylon'. He died about 529 B C and was buried in the royal city of Pasargadae.

Cambyses, the son of Cyrus, was coarse and tyrannical, but successful. In the seven years of his reign he added Phoenicia, Cyprus, and Egypt to the Persian Empire. The historian Herodotus tells us that he went mad and killed himself in 522 B C.

The Empire under Darius

In the following year Darius came to the throne. The Empire was in turmoil after its mishandling by Cambyses, and it took some time to secure support from some of its provinces. Darius set about extending the Persian Empire in all directions. He led an expedition north-westwards across the Danube to the Scythians of southern Russia, and another east to the Indus. In Egypt he cut a canal from the Nile to the Red Sea (not the present Suez Canal) so that his boats might sail from the Persian Gulf to the Mediterranean.

Darius now decided that it was time to add Europe to his list of conquests. In 492 B C he marched into Thrace and Macedonia, but his supporting fleet was wrecked off Mount Athos before he could attack Greece itself. Two years later his fleet sailed directly across the southern Aegean to Eretria, which was destroyed, and then on to Marathon. Here 20,000 troops were landed, and Phillipides was sent on his famous 'marathon' run to warn Sparta. The Persian army was defeated and Darius had to postpone his attempt to conquer Greece. In fact he



The Persian Empire about 500 B C

In one of his palaces, King Darius receives

The tomb of Cyrus at Pasargadae as it stands today

ANCIENT HISTORY OF PERSIA

never tried again, dying in 486 B C, before his next expedition could get under way.

Darius had been a just ruler. He helped the Jews to rebuild their Temple in Jerusalem. He built fine roads throughout his Empire, including the royal road from Sardis to Susa, and also began to build the great palaces at Persepolis and Susa.

The palace of Darius at Persepolis

The decline

Darius was succeeded by Xerxes, who tried to carry on where his father had left off. In 481 B C he gathered together a large army and fleet from all parts of the Empire. He built a bridge of boats so that his army could cross from Asia to Europe. Herodotus tells us that it took seven days and nights for the huge army to cross the Hellespont. In order to avoid the peninsula of Athos, where his father's fleet had been wrecked, he cut a canal about two miles long, near the modern village of Nea Rodo. In the pass of Thermopylae, 300 Greeks, mainly Spartans under Leonidas, met the Persians. They fought bravely but unsuccessfully to the last man. By the summer of 480 B C Athens had been captured.

Croesus, the King of Lydia, and Nabonidus of Babylonia, both of whom he had defeated and captured in battle

Yet the collapse of Athens was not the end of Greece – at the naval battle of Salamis the tide at last turned and the Persians were defeated. Xerxes, who had been watching from a hill overlooking the sea, fled north towards the Hellespont. His cause was lost, and when his army was defeated at Plataea he abandoned his attempts to conquer Greece. He spent the rest of his life completing and adding to the great buildings at Persepolis which had been started by his father, Darius. He was murdered in 464 B C.

The murder of Xerxes marked the beginning of a rapid decline in Persia; a century of chaos followed, and in 330 B C Alexander the Great routed the Persians at the battle of Gaugamela. Codomannus, the last king of Persia, was killed on the road to Bactria as he fled from the battle. The Persian Empire had fallen to its old enemies, the Greeks.

NEW GUINEA

The geographical position of New Guinea

NEW GUINEA is in many ways an island divided against itself; jagged 16,000-foot peaks, torrential rivers, great forests and swamps all cut the inhabitants off from each other. As a result, many of the New Guinea tribes had little sense of national unity; for centuries they fought and killed each other. The coming of the white man added to New Guinea's physical and racial divisions; since their arrival, Great Britain, Holland, and Germany have all carved themselves slices of the island. And today the island is still divided politically. But New Guinea is no longer an unimportant island, involved in its own internal squabbles and feuds. It is now of international importance: a pawn in the game of world politics.

A FORBIDDING COUNTRY

New Guinea, after Greenland the largest non-continental island in the world, lies to the north of Australia, less than a hundred miles across the Torres Strait. The hostile nature of the country daunted early explorers. The island was claimed first by the Dutch and then by the English East India Company, but by neither was it effectively colonised.

NATURAL BARRIERS

New Guinea was extremely backward – the inhabitants had virtually no contact with European ideas or inventions. Even today, in the unexplored parts of New Guinea the inhabitants live in painfully primitive conditions.

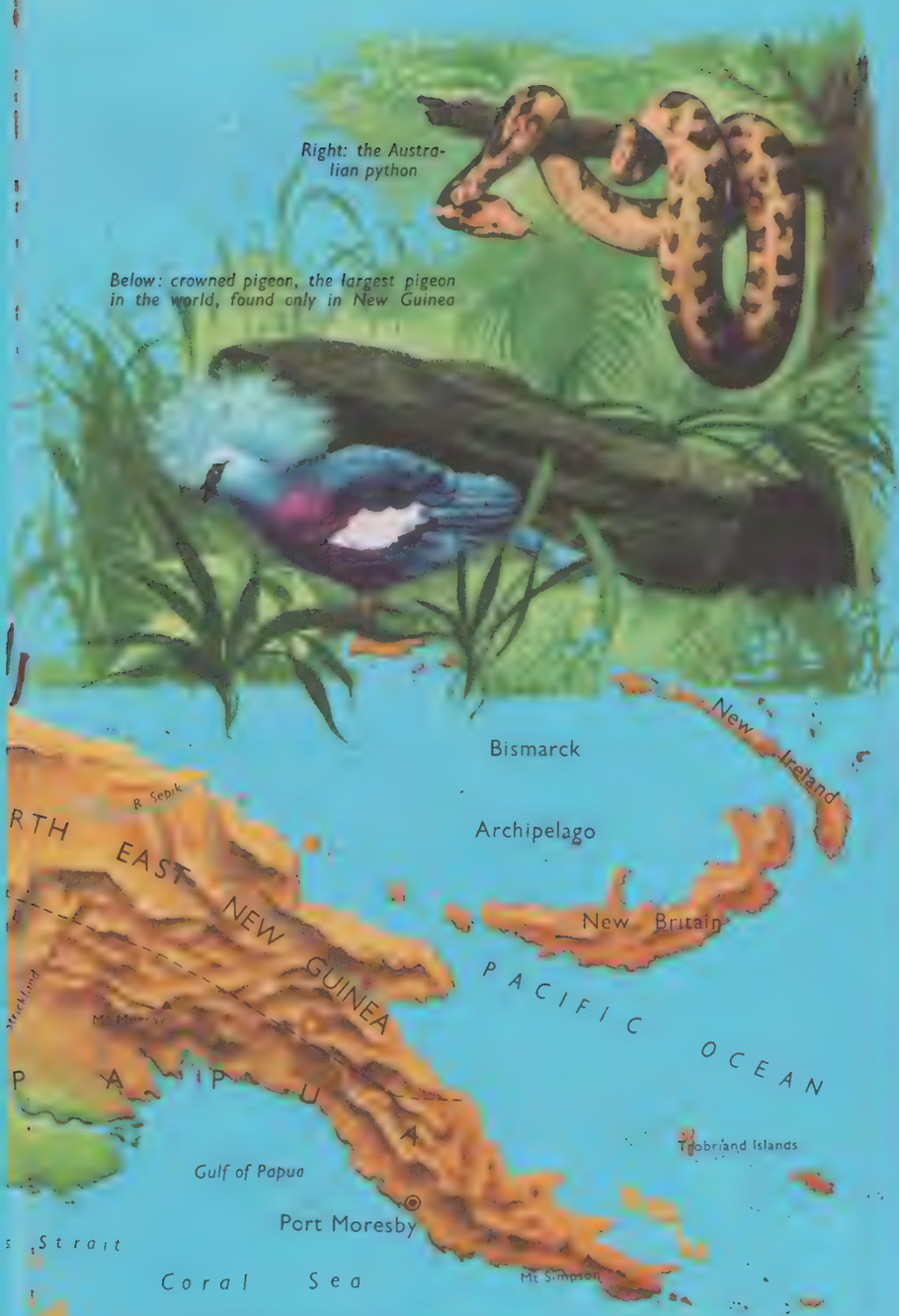
The island is dominated by the great mountain range that runs up its centre like a spine. The lush lower slopes and fertile valleys of the mountains are rain-drenched, cool, and invigorating. Above these are the great, silent, moss-covered forests which cling to the sides of the mountains from 7,000 to 11,000 feet, and above the forests are the desolate and bitterly cold slopes leading to the peaks which rise up to 16,000 feet. This tangled mass of steep, razor-backed ridges, with glowering peaks, precipitous gorges, and in places

even steaming volcanoes, acted as nearly impenetrable barriers against communication between the New Guinea tribes.

Torrential rivers like the Fly, the Sepik, and the Mamberamo pour from the ranges to drown the plains. There they disappear into vast sago and mangrove swamps, which swarm with mosquitoes, and which are infested with crocodiles. The tribes who live in these areas were once as isolated and dangerous as the swamps in which they were confined.

TRIBAL DIVISIONS

Racially, most of the inhabitants are Melanesians, whose early forefathers migrated from the Malay archipelago. But they did not settle and exploit their new territory together. Rather, at different times and in different groups, they separated into numerous small societies, which constantly intermarried and remained isolated from one another until the arrival of white administrators, who forced these primitive peoples to reorganise their simple economy, and so changed their way of life. In the very centre of the island some hundreds of thousands of people all lived on crags above fertile valleys; they blocked the passes, decorated themselves with shells, wore wigs of human hair, and fought and worked with stone implements. The lives of such tribes, like the Goilala, were governed by blood feuds continuing back through



a long and bloody history of families paying back murders with murders. The most grisly tribe was the warlike Kukukuku, great warriors and cannibals who wore cloaks of beaten bark, and lived with their own dead, whom they dried and kept.

West of the central ranges, where the mountains become even more impassable, were the homes of tribes like the Telefomin and Miamin who were constantly at war, seizing each other's people to eat or to enslave. Along the Sepik river lived head-hunting tribes who measured their prowess in human heads which they smoked, dried, and hung by the hair in long rows, and who also practised sorcery and black magic. In the south-west people like the Motu fishermen built their houses on stilts above the sea to guard against surprise attack, and on the southernmost tip lived another cannibal tribe, the Orokaiva.

The islands adjacent to the mainland were just as wild. Of these the most important is the large volcanic island of New Britain which is still frequently shaken by earthquakes. Here hunters used blow-pipes, and the heads of newborn babies were bound so that they grew thin and elongated. The trading people of the Trobriand Islands were almost unique among New Guinea tribes in that they were organised under a system of hereditary chiefs tracing their descent through the female line.

Before the coming of the white man the people of New Guinea were separated into hundreds of fragmentary groups. They spoke about 700 dialects, and had many customs which to us seem utterly repugnant Their colour and other physical characteristics varied enormously. Their lives were governed to a large extent by fear and sorcery. They were a people for the most part with no hereditary chiefs, no political organisation, and with not the slightest suggestion of political unity.

MODERNISING THE ECONOMY

European powers were at first interested solely in the gold of New Guinea, and so, to begin with, foreign annexation of the island did not produce any startling changes in the way of life of the natives. Only in the past 50 years has the penetration of European ideas made itself felt.

For a long time the economic life of the island amounted to little more than subsistence farming – scraping a bare living from the soil. While a certain amount of trade between the coastal peoples and the tribes of the remote inland had been continuing along established routes for centuries, agricultural methods were primitive in the extreme. These methods were closely linked with local religion and superstitions Various ceremonies, particularly fertility and weather rites, were commonplace, while local mythology was rich in stories of the 'first coconut', the 'first taro' and so on. Apart from the bringing of new machinery into the country, the most important European innovations have been the introduction of farming by large plantations, instead of by single villages. Moreover, new overseas markets have been opened up for New Guinea's products. Crops like beans, rice, and peanuts are still farmed on a small scale, but tree crops, mainly coconuts, cocoa, rubber, and coffee, are now grown on the plantations almost exclusively for export

An effort is being made not only to develop established industries like mining, weaving, pottery, and forestry, but also to introduce new ones like concrete-making and biscuit manufacture.

Today there is a drive to improve education in New Guinea. Great strides are also being made in medical research, which is directed particularly against the two killer diseases, tuberculosis and malaria. There are no railways, but sea and air transport are becoming highly organised, and an attempt is being made both in the eastern and western sections of the island to persuade the inhabitants to adopt the languages of their governing countries as their respective common tongues.

A HAND IN THEIR OWN DESTINY

But the initiative of foreign settlers is still behind all these advances, although agricultural, medical, and teachers' training colleges for the natives are being set up which should help them to play an increasing part in the affairs of New Guinea. More important, the natives in the territory of Papua and New Guinea are beginning to share in the government of their country In 1960 the form of government was revised to include six elected and at least five appointed native members in the Legislative Council – the central governing body

Hans Andersen with some of the scenes from his famous stories: The Staunch Tin Soldier, Little Ida's Flowers, The Ugly Duckling, The Princess and the Pea, The Red Shoes, The Emperor's New Clothes, and The Emperor's Nightingale.

'MOST of the people who walk after me will be children; make the beat keep time with little steps.' Hans Andersen said this to a composer friend when they were discussing the march which the famous writer would have at his funeral. He was certainly right about his popularity with children. He wrote 159 fairy tales and stories, which have been translated into many languages, and children all over the world have read *The Little Mermaid*, *The Emperor's New Clothes*, *The Princess and the Pea*, and many other stories with delight for over 100 years. But although Hans Andersen became famous through his stories, he never succeeded in his greatest ambition: to be a successful writer of adult plays and novels.

An unpromising start

Hans Christian Andersen was born in the Danish town of Odense on 2nd April 1805. His father was a poor, dreamy, and inefficient shoemaker. Before he left home to fight in the Napoleonic Wars he used to read aloud to his son for hours, and made him a little puppet theatre to play with. But he was a sickly man and died shortly after the war ended. Hans missed the influence of his father. He was 'spoiled' by his mother, who married again two years later, and by his grandmother. Although he went to school he learned very little beyond reading and writing, and spent much of his time alone making up little plays and stories. He avoided the company of other boys who mocked him for his dreaminess. Hans sang well and used occasionally to sing in the drawing-rooms of rich townspeople. When he was 14 he set out alone for Copenhagen where he was sure his talents would be appreciated by the Directors of the Theatre Royal. He carried a letter of introduction to Madame Schall, a well-known dancer.

HANS CHRISTIAN ANDERSEN

But in Copenhagen Hans Andersen did not find the recognition he expected. He danced in vain before Madame Schall and was curtly told by the Chief Director of the Theatre Royal that he was too tall and thin to be an actor, and that anyway the theatre had no use for uneducated people. He was advised to return to Odense and take up a trade, but he plucked up courage and made a final visit to Siboni, an Italian singer and head of the Theatre Music School. Siboni agreed to take him as a pupil, and a collection was made to provide a little money on which Hans could live. But he was not a successful singer. After his voice broke, he studied ballet, but it turned out that he had no ability as a dancer either. Yet he was still irresistibly drawn to the theatre, and wrote two plays which he sent to the Directors. They told him that because the second play showed some talent he was to be put in the care of Jonas Collin, a State Councillor, and that public funds were to be used to educate him. Hans was sent to grammar school at Slagelse, where he was alone and unhappy, a 17-year-old giant among the smaller boys, and the butt of his teachers.

Hans returned to Copenhagen when he was 22, and soon his first book, a description of a walk through the town, was published. He had grown into an ugly and highly emotional youth.

Although he had many devoted friends Hans never married. After he had published two volumes of poetry, Collin, the State Councillor, advised him to travel abroad. For the rest of his life, which was often lonely, Hans spent much time abroad; first as a penniless writer living extremely simply, and later as an honoured guest of kings and queens, High Society, and fellow authors, including the novelist Charles Dickens. When he returned home from Italy in 1835 he wrote a very successful novel, *The Improvisatore*, which was set in Italy and told of the struggles of a young poet. To make some money while it was being published he wrote his first four children's stories, three of which were based on folk stories, and which were an instant success.

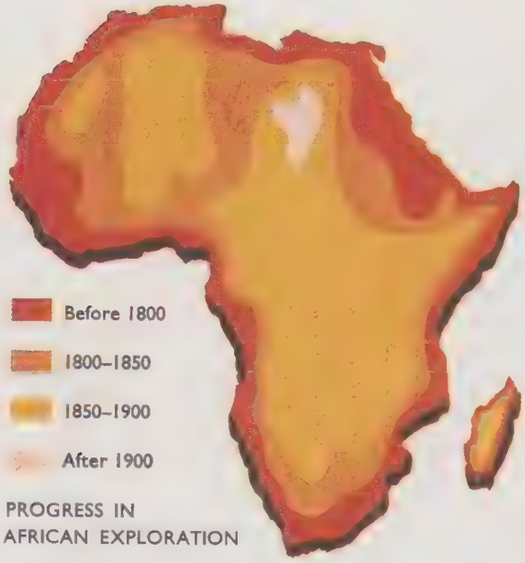
Recognition and fame

These tales brought Hans Andersen recognition as a writer. He wrote novels, plays, and poetry which were often criticised, but each new set of stories for children was received with delight. They reflected his earlier experiences. The grim poverty of his mother's childhood is found in *The Little Match Girl*, his hopeless love for the Swedish singer Jenny Lind in *The Emperor's Nightingale*. He lifted the smallest and most humble objects – a button, a top, or a spoon – to great importance by the power of his imagination. Nothing was too small to escape his notice. 'Life itself is the most wonderful fairy tale,' he wrote in his autobiography *The True Story of My Life*.

In 1867 State Councillor and Professor Hans Andersen (for such he finally became) was granted the freedom of his home town, Odense. In 1875 he died in the house of a rich friend near Copenhagen. In the King's Garden, Copenhagen, stands a statue of Hans Andersen reading a book; the house where he was born is now a popular museum. The dreams of the solitary boy were amply fulfilled, as in one of his most famous tales, when the ugly duckling, after sorrow and hardship, finally became a swan.

UNTIL the 1850's little was known about the centre of Africa; for centuries Europe had been thrilled by strange tales that had come out of the interior: of savage tribes; of great snow-capped mountains close to the Equator; of tremendous cataracts and mighty fountains which were said to be the source of Africa's greatest river, the Nile. Indeed it was the whereabouts of the source of the Nile that most fascinated people about central Africa. Ptolemy (see page 1238) thought that it began in two great lakes behind which rose mountains which he called the 'Mountains of the Moon'. Many of these tales and ideas bear some resemblance to the truth, and show that from the earliest of times the interior had been occasionally visited, but had never been systematically explored.

More, however, was known about the African coast. As early as the 7th century B C, the Pharaoh Necho sent Phoenician sailors to sail around the continent from the Red Sea to the Mediterranean. It took them two years. But as time went on people forgot about this enterprise and began to doubt whether Africa was surrounded by sea at all. It was not until the end of the Middle Ages that anyone was to sail round Africa again. In 1486 Bartholomew Dias (see page 1434) rounded the Cape of Good Hope. In the following centuries Europeans colonised the coast of Africa, but until the 19th century few ever ventured deep into the interior.



PROGRESS IN AFRICAN EXPLORATION

The explorers' motives were mixed. The early Portuguese navigators were inspired by a curious combination: a wish to extend Christianity, and to obtain slaves. The search for slaves had also brought the Arabs into the interior. Before the 19th century they knew more than anyone else about the centre of Africa. Many of the 19th-century explorers found themselves almost irresistibly drawn to Africa; some wished to extend the colonial empires of their countries; others to find more markets for their produce, or to bring civilisation and religion to the natives.

EXPLORATION OF AFRICA

Here are some of the explorers who opened up the centre of Africa, and made it possible for settlers of all nationalities to make Africa their home:

James Bruce (Scottish). In the 1770's Bruce led an expedition that discovered the source of the Blue Nile. Few would believe his stories about Ethiopia – especially the one in which he claimed to have seen a native hack some flesh from a cow and eat it. A wit of the time wrote:

'Nor have I been where men
(what loss alas)
Kill half a cow and turn
the rest to grass.'

Mungo Park (Scottish) made two expeditions to the Niger basin. The first was in 1795. Accompanied only by a negro servant and a boy, he ventured up the Gambia river and, after incredible hardships, reached Sego in 1796, where he was imprisoned by the Arabs. He escaped and returned to England in 1799. In 1805 he led a second expedition. It got as far as Bussa, where he and all his men were killed by hostile natives.

Hugh Clapperton (Scottish) started life as a cabin boy. He made two expeditions to Nigeria (1822–1825 and 1825–1827). During the first he discovered Lake Chad. He died near Sakota in 1827.

René Caillé (French), disguised as a Muslim beggar, journeyed from Sierra Leone to Timbuktu, and from there to Morocco (1827–1828). He also crossed the Sahara, suffering terrible hardships.

Heinrich Barth (German) was the only surviving member of an expedition sent out by the British Government to the Niger countries in 1850. He returned five years later with a detailed knowledge of the country between Timbuktu and Lake Chad.

Sir Richard Burton (English) was a scholar-explorer with an astonishing gift for languages. In 1854 he explored Somaliland, and in 1858 he discovered Lake Tanganyika.

John Speke (English) was second-in-command of Burton's expedition. On its return journey he left the party and alone discovered the Ripon Falls of Lake Victoria, which Speke correctly claimed was the principal source of the Nile.

David Livingstone (Scottish) was a missionary in South Africa who made many journeys into the interior (see page 1194). He discovered the river Zambesi, the Victoria Falls, and Lakes Shirwa and Nyasa. In his last expedition he explored cannibal country and returned to Ujiji in a state of collapse, where he was found by Stanley in 1871. He died in 1873 while trying to discover the source of the Nile. Although John Speke had, in fact, already discovered it, few people were prepared to believe him.

Sir Henry Stanley (Welsh) was a journalist on the *New York Herald* when he was ordered to find Livingstone, who was lost in the African interior. As we have seen, he did. In 1871 he undertook one of the greatest journeys in the annals of exploration. Determined to end the argument about the source of the Nile, he first sailed around Lake Victoria, and proved that the Ripon Falls were the only major outlet; he then made sure that Lake Tanganyika was not the source of the Nile by sailing round this lake as well. Finally, he determined to see whether, as Livingstone thought, the Lulualaba river was the Nile. So he sailed down this river, not knowing where it would take him. As we know now, the Lulualaba runs into the Congo. Stanley, half starved, arrived at the west coast of Africa 999 days after the beginning of the expedition, at the mouth of the Congo. He had proved beyond doubt that the source of the Nile was the Ripon Falls. But he did not stop there; he went on to discover much new territory which eventually became known as British East Africa.

The type of African carving which fascinated explorers and intrigued Europe

An explorer plunges into the tangled African jungle, followed by a column of natives carrying provisions

THE GREAT WALL OF CHINA

The Great Wall of China snakes its way for miles across the mountains of northern China. For over 2,000 years it has stood as a monument to the Chinese belief in walls as a defence

THE Great Wall of China is said to be the only structure built by man on the earth which would be visible to observers on the moon. It covers a distance of 1,500 miles as the crow flies, from the coast opposite the Liaotung Peninsula to the last fortress of Chia'yu'Kuan in Central Asia, crossing the provinces of Hopei, Shansi, Shensi, and Kansu. But its actual course, twisting and turning, following the lines of mountain peaks and ridges, sweeping across deep valleys, covers over 2,000 miles.

The Great Wall of China (1,500 miles) is nearly three times the length of the United Kingdom

In the eastern section its height varies from 15 to 30 feet, and its width from about 25 feet at the base to 15 feet at the top, where there is a platform wide enough for six horsemen to ride abreast, protected by parapets fortified with battlements. When the Wall was first built it had about 25,000 towers, each 40 feet square and 40 feet high, projecting from it every few hundred yards, with loopholes from which the defenders could shoot at attackers. Thousands of these towers are still standing. There are also many watch-towers outside the Wall on hill-tops or passes. These and the towers of the Wall were used for signalling, with smoke or flags by day and with fires by night. The approach of invaders could be reported at once, and reinforcements summoned to any part of the frontier.

The building of the Wall

The great Ch'in Emperor Shih Huang Ti joined three earlier frontier walls together for his Great Wall, which was to form a boundary between China and the north, and keep out the dreaded nomads of the Mongolian steppes. The Wall was designed to strengthen China's defences; it was not then, as it became in Ming times, a substitute for a strong army and state.

Construction was started about 221 B C and the structure was practically complete when Shih Huang Ti died in 210 B C. The man who did most in carrying out the Emperor's plans was General Meng T'ien; in 221 B C he marched north against the Tartars with an army of 300,000, drove them back from the Yellow River into the steppes, and set his army to work on building the Wall. They were joined by thousands of convicts and conscripts. Year after year, in icy winds and snowstorms in winter and in dust storms in summer, the work went on, and so many men died that the Wall was sometimes called 'the longest cemetery in the world'.

Structure of the Wall

The core of the Wall is earth and stone, faced with brick, and set on a stone foundation. In hilly places two parallel trenches were dug or drilled out of the rock, 25 feet apart. Great blocks of granite were laid in the trenches up to several feet high, and along each side baked bricks nearly 2 feet long were laid at right angles to the face of the wall, cemented together with a white mortar so hard that no nail could be driven into it. The space between the two brick walls was filled in with earth, which was rammed down hard. North of Peking the Wall follows the crests of mountains so steep that even goats can hardly climb them. Further west, in Shensi and Kansu, the Wall often follows the easiest route, and is built of loess, or yellow earth, faced with a thin layer of brick or stone.

The Han Emperor Wu Ti (140–86 B C) extended the Wall to its greatest extent and built fortresses in Central Asia itself. The Emperors of the Ming Dynasty (A D 1386–1644) carried out more work on the Wall than any other rulers of China, repairing and rebuilding the whole length of the Wall, and building new walls west of the Yellow River. The Wall which now exists nearly all dates from the Ming Dynasty, but many of its foundations are over 2,000 years old; the long line of grey brick goes back into China's past, dividing two ways of life, separating the nomad from the peaceful farmer.

> *'Of old the battles along the Great Wall*
> *Were fought with high courage,*
> *But the yellow dust envelops ancient and modern alike,*
> *And white bones lie scattered among the grass.'*

(Frontier song of the T'ang period, 1,000 years old)

GRAFTING

PERHAPS you have sometimes wondered after eating a particularly delicious fruit whether it is possible to plant the pips or stones in the garden and grow a tree of your own. Unfortunately, although your plant might grow, you would be very disappointed in its fruit, which would probably be small and malformed, and quite unlike the parent. This is because the plant would have reverted to its natural state; although it would still be of the same *species*, all the special qualities of the particular *variety*, which growers had painstakingly developed over the years, would be lost. How can this be avoided? Only by *grafting* or, alternatively, by *budding*.

What is grafting?

Grafting is not a new discovery, but has been practised since ancient times. It is simply the insertion of a first-year shoot or *scion* cut from one plant of a choice variety into the hardy rooted portion or *stock* of another. The new single plant which results will combine the best qualities of both parents. In this way we can multiply plants true to type, increase the varieties by making different combinations, and, most important, give a new lease of life to old or damaged trees. We can also develop certain trees so that they each bear two or three varieties of fruit. But only closely related strains should be grafted. Sometimes in the woods you see branches of large trees apparently growing from a completely different species; do not be misled into thinking that this is an example of grafting in nature, for that does not exist – it will simply have been caused by the seed of one tree becoming lodged in part of another, and, because it found enough moisture, taking root there.

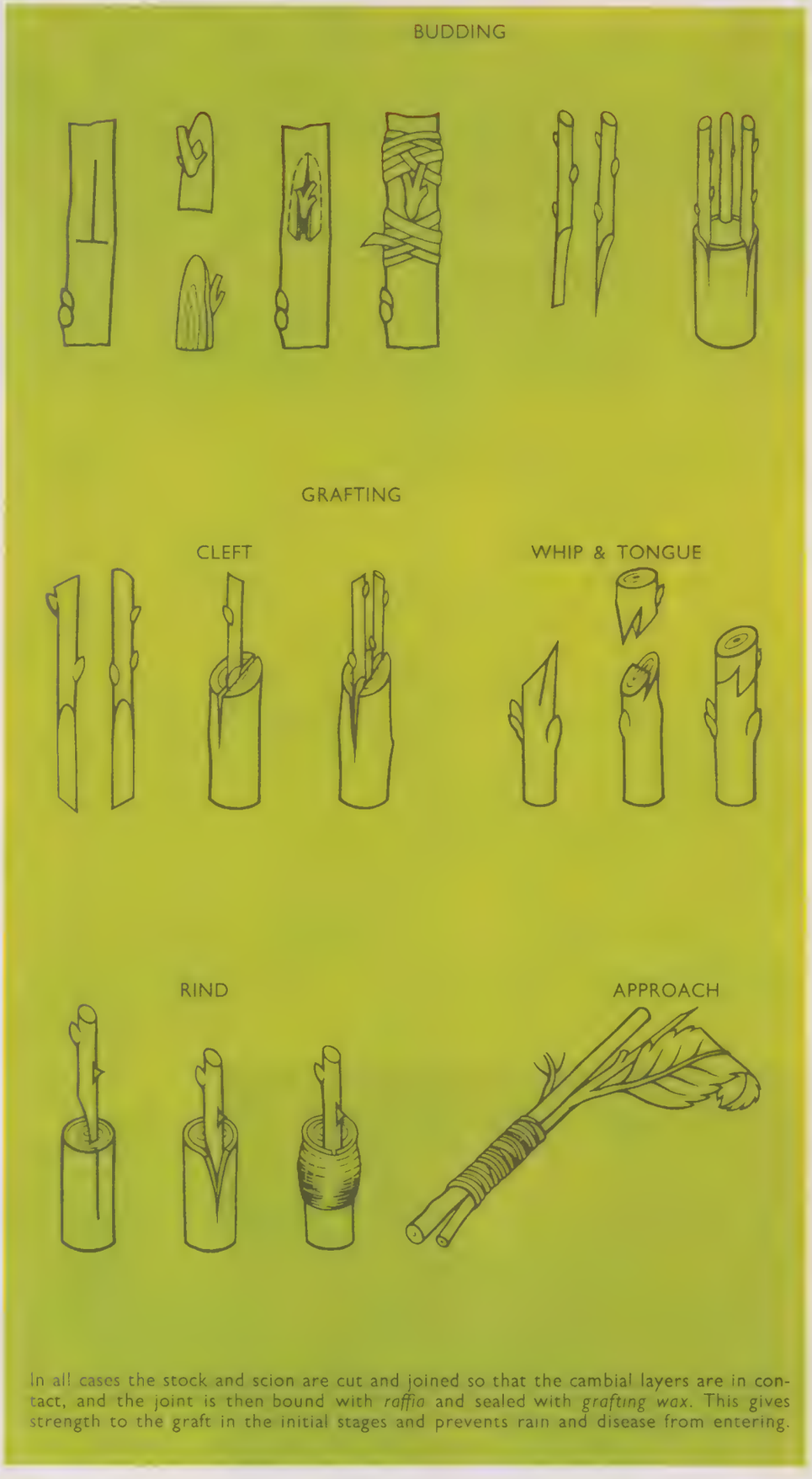
The art of grafting

The two plants are welded together by the *cambium*, the inner layers of the stock and scion, which produces the new vegetative cells. The two cambial layers must therefore be brought into contact with each other so that they can grow together.

Grafting is carried out in the spring when the sap is rising in the stock, but since it is important that the scion should be dormant at the time of grafting, the shoots are cut in anticipation the previous year.

Budding

Budding is similar to grafting except that a single bud rather than a shoot is used as the scion, and it takes place in late summer. Whereas grafting is the method usually used for apples and pears, budding is used for plums and peaches.



In all cases the stock and scion are cut and joined so that the cambial layers are in contact, and the joint is then bound with *raffia* and sealed with *grafting wax*. This gives strength to the graft in the initial stages and prevents rain and disease from entering.

The Westminster School of Industry, where children were taught simple crafts by a member of the Ragged Schools Union

SHAFTESBURY: friend of the poor

ALTHOUGH it is spring, a cold east wind blows bitterly through the London streets. Huddled together for warmth, their only covering a few filthy rags, two small boys try vainly to get to sleep. But hunger keeps them awake, and they lie listening to the murmurs of the other children who have taken refuge for the night under the arches of Holborn Hill.

Then, as though in a dream, they see bending over them, a candle in his hand, a tall, well-dressed man who tells them to follow him. Together with about 20 others, some grown-up, some children, they find themselves in a warm, bright room. As they listen to what the stranger has to tell them – that they need never go hungry or cold again, and that they will have beds to sleep in and a trade to learn – they wonder who this man is. He speaks to them as they have never been spoken to before, with gentleness, kindness, and sympathy.

An unhappy childhood

This friend of the poor was Anthony Ashley Cooper, 7th Earl of Shaftesbury, who was born on 28th April 1801. His own childhood had not been a happy one. His parents were strict and not particularly interested in him. At the age of seven he had been sent to a private school in Chiswick where he was half-starved, beaten, and bullied by the older boys. The only person who was ever kind to him was his parents' housekeeper, Maria Millis, whom he called 'the best friend I ever had'.

He went on to Harrow, and it was there, when he was nearly 15, that he saw something that influenced his whole future life. He was walking alone down Harrow Hill when he heard sounds of drunken merriment. Round the corner came a rowdy group carrying a roughly made coffin, obviously that of a pauper. Staggering as they came, they suddenly dropped their burden in front of the horrified schoolboy, and broke into curses and drunken laughter. Anthony determined, there and then, that if this was the fate of the poor and friendless he would devote his life to helping them.

Lord Shaftesbury sees for himself the plight of young people working in a coalmine

A philanthropist in Parliament

Three years after young Lord Ashley (his courtesy title) had taken a first-class honours degree at Oxford he became Member of Parliament for Woodstock, at the age of 25. Although he supported the Conservatives, he frequently found himself in conflict with them. This was mainly because of his championship of shorter hours of work and better conditions in the factories. At that time children as young as four or five worked for 14 hours a day in filthy conditions, beaten, starved, and often crippled by falling against moving machinery.

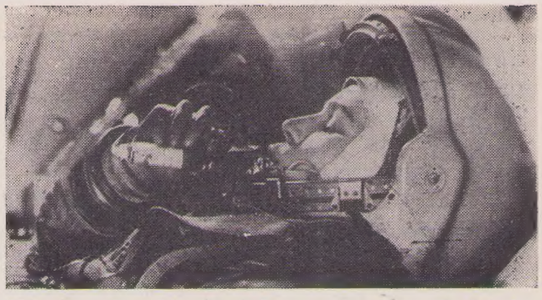
Lord Shaftesbury (he succeeded to his father's title in 1851) was as concerned about the education and religious welfare of these children as he was about their physical distress. One of his life-long interests was in the Ragged Schools Union, which provided the only education that impoverished people could get.

But his sympathy for suffering extended even wider. He tried to improve the housing of the working class and he pleaded for parks and playgrounds. In addition he supported foreign missions, was one of the founders of the YMCA, and took a leading part in many religious and philanthropic movements.

His marriage to Emily Cowper, whom he called Minny, was an extremely happy one and they had a large family. When she died in 1872 he felt very much alone. He continued to fight for reform, but a few weeks after his 84th birthday he caught a chill and died on 1st October 1885.

Shaftesbury's memorial, the famous statue of Eros, stands in the centre of London's Piccadilly Circus; but a far greater memorial was the gratitude of the 'poor and friendless' who wept when they heard of his death.

WOMEN IN THE SKY



Valentina takes a leisurely sip from a tube of space food during her training to become the first woman cosmonaut.

Amy Johnson, the most famous airwoman of all, just before departing for the Cape.

Amelia Earhart – a mystery.

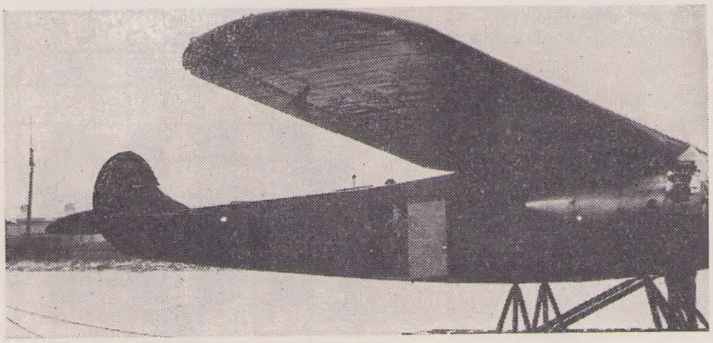
Jean Batten waves to the crowd after her arrival in England from Australia. She was the first woman to fly from England to Australia and back again.

'A BRILLIANT star has flared up in the cosmic firmament. It outshines all the film stars in the world. Never and in no country did women ever attain such a height.'

So the Soviet newspaper 'Tass' exulted over the achievements of Valentina Vladimirovna Tereskhova, the first woman cosmonaut. In her space ship 'Vostok VI' she circled the earth – with Colonel Bykovsky orbiting at the same time in another capsule. After three days aloft and 48 orbits, Valentina returned to earth. Bykovsky landed shortly afterwards, having completed 81 orbits – a world record. But Valentina stole all the glory. She was greeted by huge cheering crowds and a great hug from Mr Krushchev.

Not for some time has a woman in the sky hit the headlines. Today space flight and aviation have become a complicated business only to be undertaken by those with long professional training – and women are not normally selected for this training. But this was not always the case in the days before the jet and rocket. In primitive aeroplanes, sometimes not much larger than a single giant jet engine of today, daring women aviators blazed a trail across the sky. Valentina had a cosy capsule in which she was able to take a 'nap'. The early women aviators had bumpy, noisy, and often unreliable 'planes. Sometimes they had little flying experience, but their spirit was dauntless.

Amy Johnson's Gypsy Moth, 'Jason', on view at Croydon Airport after she had flown to Australia alone – the first woman to do so.



Amelia Earhart at the cabin door of her seaplane 'Friendship'.

The number of flying hours that some of these aviators had chalked up before they set out on long trans-continental flights would have appalled today's flying instructors.

But despite their apparent in-experience, they were often successful.

Amy Johnson, a young girl from Yorkshire, was probably the most famous of them all.

She had always had a passion for flying – and she was good at it. But when she announced that she wanted to fly to Australia alone, everyone said it was impossible.

Amy and 'Jason'

She had less than 100 flying hours in her log book when she took off from Croydon Airport in the chill dawn of 5th May 1930 in her little Gypsy Moth 'Jason'.

Only a few spectators were there to raise a feeble cheer, and to the world it was just another stunt. But Amy Johnson flew the 12,000 miles to Australia – and the world cheered.

When she returned to London, she was fêted by millions – and that was the start of her fantastic flying career.

It ended in January 1941 when she baled out over the Thames estuary while flying 'planes from the factory to the RAF. Amy Johnson drowned in the freezing water – and left behind a record of unparalleled achievement for a woman in the sky.

Another airwoman, Amelia Earhart, an American, left behind one of the greatest flying mysteries of all time, when she disappeared over the Pacific Ocean while trying to fly round the world in 1937.

She took off from Miami, Florida, with a Captain Fred Noonan as her navigator, and the flight took her over the Caribbean, the Atlantic, and on to Australia and New Guinea.

America watched the 37-year-old air-woman's progress with bated breath. It was a tremendous flight. Only one more ocean to cross . . . the Pacific.

Then at 3.30 p.m. on July 3rd a ship, the *Itasca*, picked up a radio message from Amelia and her navigator: 'Down to our last half-hour's petrol supply, no land in sight.'

And that was the last anyone ever heard of Amelia Earhart. The anguish which swept America was matched by the scale of the search ordered. It lasted for a fortnight, but no trace of her aircraft was found.

Later there were stories that she had landed and had been captured by the Japanese. But these rumours were never proved to be true.

To Australia and back

While Amy Johnson was breaking records, a young New Zealand girl called Jean Batten was preparing to make her bid for flying honours. And she succeeded. After two unsuccessful attempts, she managed to fly from England to Australia.

When she achieved her ambition she beat Amy Johnson's record by more than four days. Then in April 1935 she flew the other way – Australia to England – and became the first woman to complete the double trip.

Letter from the Editor-in-Chief

37 HERTFORD ST.
LONDON W.1

MUCH of *Knowledge News* this week is devoted to the Papacy. The late Pope John XXIII may have been very different from his predecessors – but there was one thing about him which was *not* different. He was an Italian. The last non-Italian Pope was a Dutchman, Adrian VI, who lived in the 16th century.

But did you know that there was an English Pope? His papal name was also Adrian – Pope Adrian IV.

Rags to riches

The story of Nicholas Breakspear, as he was known before he became Pope, is a real 'rags to riches' one. He was born early in the 12th century; his father was a poor clerk. Few born into such lowly positions in society could then hope to reach the Church's 'top job'.

We know very little about Nicholas's early career. There is a story that he studied in Paris, but the first real insight we have into his life is in France, where he had joined the Augustinian monastery of St Rufus, Avignon. There he did such menial tasks as sweeping the floor. But for some reason the Canons elected him their Abbot. Why they did this is not certain. St Rufus was rather a lax monastery, and perhaps they thought that Nicholas might be a lax Abbot. But this was not the case, and soon the Canons were complaining to the Pope about the harshness of their new Abbot.

In fact, Nicholas and a delegation of the angry Canons actually appeared before Pope Eugenius III in Rome. Eugenius made a curious decision. He told the Canons to go away and elect another Abbot. Then he made Nicholas Bishop of Albano, thus keeping him at Rome. As well he made Nicholas a Cardinal. Obviously he had seen this young Englishman to be a man of ability, like other Englishmen who were at this time at the Papal Court.

Nicholas evidently impressed his new master, and was sent on an important mission to the Scandinavian churches, in which he was extremely successful.

Soon quarrelling

In 1154, shortly after his return, he was elected Pope and took the name of Adrian. He showed that he had a tremendously exalted view of the Papal office, and was soon quarrelling with the Emperor Frederick Barbarossa. Actually before the contest could be decided one way or the other Adrian died (1159).

His contemporaries were impressed by his strong character; had he lived longer, Adrian might have been one of the greatest Popes of the Middle Ages.

John Chancellor

Super-brains

DEAR EDITOR—In 'World Window' of *Knowledge* No. 64 you mentioned electronic calculating machines. People think that these machines, called computers, are fantastic brains capable of destroying the world in a matter of moments. This is not true. They are like our brains; the only difference is that they 'think' a lot faster than we do and are larger than the human brain.

There are three main parts to a computer: first, the input or machine which transmits information from the person operating it. The second part is the 'brain' or storage compartment where the information is kept. The third part is the output or machine which tells the operator the answer to some problem he has put into the machine.

In the future, computers will probably be about the size of a refrigerator and nearly everyone will own one. Already they play a large and varied part in our lives, such as guiding rockets and keeping the accounts of large firms.

Ivor J. Farrell,
21 Homestead Avenue,
Collaroy, N.S.W., Australia.

Vanishing Shilling

DEAR EDITOR—In *Knowledge* No. 130 Claire Morley gave a problem about a vanishing shilling. In her last paragraph she said: 'They have each, therefore, paid 9*s*., making 27*s*. in all, and the waiter has 2*s*. That makes 29*s*.'

You write – thousands read!

Claire has forgotten about the 3*s*. change which the waiter gave the men. That makes 32*s*. Where has the other 2*s*. come from?

The solution is that the 2*s*. which the waiter has is part of the 27*s*. which the men have paid. Then the 3*s*. change makes up their original 30*s*.

Walter S. Allan,
127 Broomhall Crescent,
Corstorphine, Edinburgh 12.

Many readers sent in a solution to Claire's puzzle – I am glad so many spotted the flaw in it!—Editor.

The People of the Veil

DEAR EDITOR—Once when my father was going on business we had to go through part of the Sahara Desert, and stayed at an oasis, Ghardaia, for one night.

Although it was very dusty, we decided to go for a walk before our lunch. There were many Arabs talking busily in the narrow street. I looked down the dirty street and saw a dark figure walking along. I asked my father who it could be.

He told me it was a Touareg, people who were in the habit of attacking caravans. Immediately the other Arabs began to talk uneasily, for they were afraid of this person. My father told us not to worry, for they caused no harm amongst crowds of people.

The Touareg wore long robes, which his people wear to keep themselves free from dust. I was also told that they do not take off their masks when eating. Instead they lift up the flap covering their mouths to eat.

I was surprised to learn that, but my father told us that it was the custom, especially among the leaders.

Diana Shearer,
15 Roston Drive,
Durban, Natal, South Africa.

Very interesting, Diana. Their curious use of 'masks', as you call them, have got the Touareg the name of 'The People of the Veil'. In fact, unlike many other North African people, the veil is worn by men, not women. There is an article about them in Knowledge *No.* 132.*—Editor.*

Spy and a Tooth

DEAR EDITOR—Here is an ingenious case of spying.

In 1939 members of an international spy gang were tried in Paris. One of the accused was a Roumanian dentist, and one of the girl messengers had a hollow tooth.

The dentist would write the message on thin paper, tuck it into the tooth and hide it under a temporary stopping.

John Vanek,
12 Newcombe Park,
Mill Hill, London, N.W.7.

Can you answer these?

Add one letter at the end of each word below so that you make a set of new words read horizontally, and also make a word vertically with the new letters you supply. (The letters you add must be different in each case.)

1.
STAR –
STAR –
STAR –

2.
HER –
HER –
HER –
HER –

3.
PAL –
PAL –
PAL –
PAL –

Study the first-line example, then fill the gaps by using the same principles.

4.

64	128	32
18	–	–
27	–	–

5.

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$
$\frac{3}{4}$	–	–
88	–	–

6.

93	31	15
87	–	–
15	–	–

Underline the word which is the *rhyme* of the opposite of the word given in capitals:

7. LITTLE – tiny, hate, tall, many.
8. UPPER – speck, mouse, mower, tip.
9. COMFORTABLE – spare, greasy, healthy, poor.
10. Provide numbers to complete these equations.

? + 16 = 1
? − 16 = 1
? × 16 = 1
? ÷ 16 = 1

ANSWERS

1. *Letters added:* S E T.
2. *Letters added:* B O D E.
3. *Letters added:* E L M S.
4. 36, 9; 54, 13½.
5. $\frac{1}{6}$, $\frac{1}{12}$; 44, 22.
6. 29, 14; 5, 2. *(Note: fractions are ignored in the example.)*
7. *Hate (great).*
8. *Mower (lower).*
9. *Greasy (uneasy).*
10. −15; 17; $\frac{1}{16}$; 16.

BRAIN ? BOX

1. 'Say, when a cow's lying down, which end of her gets up first?'
'.....'
'Well, then, a horse?'
'.....'
'Which side of a tree does the most moss grow on?'
'.....'
'If fifteen cows are browsing on a hillside, how many of them eats with their heads pointed the same direction?'
'.....'
This is an extract from a book most young people have read for many years. The conversation was between a lady and a boy who was at the time disguised as a girl. Can you name the book and its author, and give the boy's four correct answers?
2. The maximum width and minimum length of a soccer pitch are the same, namely 100 yards. Would a club be justified, therefore, in using a square pitch? If not, why not?
3. Draw a shape like a long potato leaning slightly to the right.
Call this NORTHAMPTONSHIRE. Then put the following neighbours in position in and around it: Bedfordshire, Buckinghamshire, Cambridgeshire, Huntingdonshire, Leicestershire, Lincolnshire, Oxfordshire, Rutland, Soke of Peterborough, Warwickshire. (They are not given in the right order here.)

ANSWERS

1. *The Adventures of Huckleberry Finn* by Mark Twain. His answers were: 'The hind end, mum' – 'The forrard end, mum' – 'North side' – 'The whole fifteen, mum.'
2. No. If the pitch was square, it would no longer have 'length' and 'width', as required by the laws of the game.
3. The Soke of Peterborough is part of Northamptonshire. It is at the northern end (top of your 'potato'). The other counties, working round in clockwise direction starting at the north, are: Lincolnshire, Cambridgeshire, Huntingdonshire, Bedfordshire, Buckinghamshire, Oxfordshire, Warwickshire, Leicestershire, Rutland.

HIGH-SPEED CROSSWORD

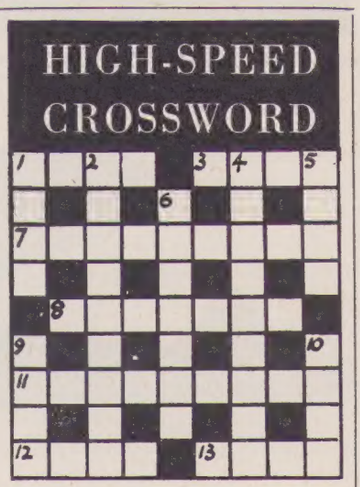
Clues Across

1. Sir's wife (4).
3. Clever (4).
7. Weddings (9).
8. Notable (7).
11. Moisture given out (9).
12. Part of London (4).
13. It is not an offence to poach these (4).

Clues Down

1. A tree to drink (4).
2. In Devon for the Navy (9).
4. Start (9).
5. This one is not difficult (4).
6. Great Swedish naturalist gives this name to his system of classifying specimens (7).
9. Pollen gatherers (4).
10. Finishes (4).

Solution next week.



SOLUTION TO LAST WEEK'S CROSSWORD

ACROSS: 1, Typed; 4, Vie; 6, Poe; 7, Sites; 8, Middlesex; 10, Stray; 12, Red; 14, Sap; 15, Depth.

DOWN: 1, Top; 2, Plead; 3, Displayed; 4, Vat; 5, Essex; 8, Masts; 9, Scrap; 11, Rip; 13, Doh.

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The Elizabethan theatre

Professional actors had already appeared in some of the later Morality plays. A law passed in 1531 said that all actors must place themselves under the protection of some great nobleman. They were regarded as his servants, and had to wear his livery (uniform).

There were still no permanent theatre buildings in England. Plays were performed in the courtyards of inns. The rich watched from the balconies, while the ordinary people stood together in the yard. The stage was a wooden platform often balanced on beer barrels.

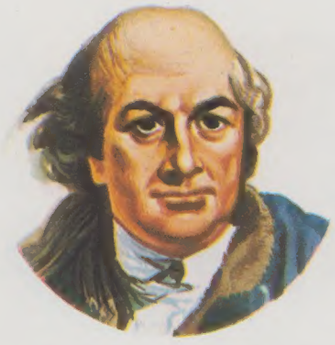
An actor called Richard Burbage built what might be described as the first modern theatre at Shoreditch, in 1576. Most of the early theatres (see Literature: part two) were built on the south bank of the Thames which was beyond the boundary of the City of London. They were made of wood, and the floor was covered with rushes. The first brick-and-stone theatre was built in 1623 and called The Fortune.

The stage was divided up into different areas. There was the upper stage – really a balcony – which was put to good use in such scenes as the famous 'balcony scene' in Shakespeare's *Romeo and Juliet*. At the back of the stage there was a smaller room which could be curtained off. This was used for bedroom scenes such as the murder of Desdemona in *Othello*. The stage jutted out a long way, and was surrounded on three sides by the audience.

There were no female actors, and women's parts were played by boys or young men. To overcome this difficulty many Elizabethan plays required the heroine to disguise herself as a boy. By modern standards, Elizabethan actors were 'hams' – that is, they grossly over-acted. Their movements as well as their voices were extremely stylised, and they would show grief by the simple method of throwing themselves on the floor and groaning.

The Restoration drama

Oliver Cromwell and his Puritan Parliament closed down the London theatres, but drama began to flourish again after 1660, when Charles II came to the throne. Charles was very fond of the theatre, but the middle classes, on the whole, kept the Puritan attitude to the theatre, which therefore tended



David Garrick (1717–1797), *actor and manager of the Drury Lane Theatre*

to become the plaything of the aristocrats. Actresses began to replace the youths of the Elizabethan stage. Costumes became complicated, and not just clothes in the contemporary style.

Plays were written about the intrigues of aristocrats. This type of drama is now known as the *comedy of manners*. These plays were often brilliantly witty but rather superficial. Shakespeare's plays were still performed, but sometimes they were rewritten and the blank verse changed to polished rhyming couplets.

The theatres became covered, and the stage no longer jutted out so far into the audience. Wealthier people tended more and more to enjoy higher-priced accommodation in boxes. A curtain was used at the beginning and the end of the play.

The 18th and 19th centuries

During the 18th century many new theatres were built. In 1732 the New Covent Garden opened. It had a large auditorium, and this meant that the stage had to be brightly lit if it was to stand out for the audience at the back of the theatre. To achieve this, lights were concealed behind coloured silk screens. The theatre was now ceasing to be a purely courtly entertainment, and middle-class patrons flocked to see the comedies of Sheridan and Goldsmith.

One of the most famous actors of the time was David Garrick, a close friend of Dr Johnson. His style of acting was more natural than that of some older actors. When he had to play King Lear demented by the murder of his daughter Cordelia, he carefully studied the behaviour of a friend who had become mad when his child died.

In the 19th century scenery became much more elaborate. A lot of stress was placed on comfort, and red plush upholstery and carved, gilded boxes appeared. The front of the stage was cut back to make room for the orchestra pit. The Victorians made little progress in drama, and produced few notable playwrights. But Shakespeare's plays enjoyed renewed popularity, particularly towards the end of the 19th century, and the great 'Shakespearean' actor, Henry Irving, received a knighthood.

The modern theatre

In the earlier years of this century gifted and witty playwrights like Bernard Shaw and Oscar Wilde wrote such outstanding works as *St Joan*, *Pygmalion*, *The Importance of Being Earnest*, and *Lady Windermere's Fan*. But this standard was not maintained and the English theatre declined in the inter-war years. In some ways Shaw and Wilde had been too good, because later playwrights copied their technique without sharing their skill, and the result was a predominance of superficial plays dealing with the problems of a class of people who were rapidly ceasing to be a dominant force in society.

The present-day 'revival of the theatre' in England is something which has happened since the Second World War. The success of

Henry Irving and Ellen Terry in Olivia, *from Oliver Goldsmith's* The Vicar of Wakefield

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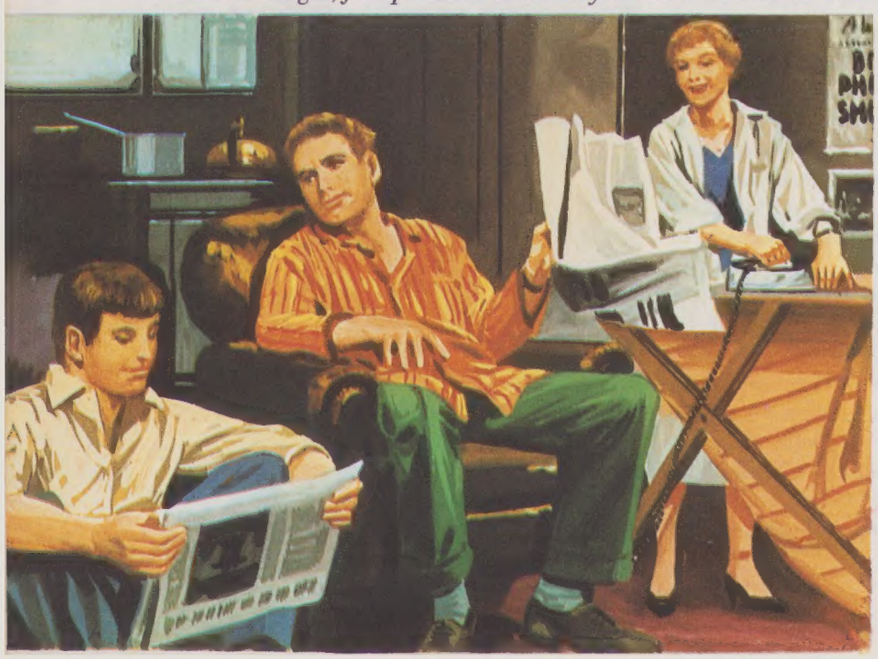
A scene from The Ideal Husband *by Oscar Wilde*

John Osborne's play *Look Back in Anger* was followed by a spate of plays dealing in a realistic way with the 'lower classes'. For the first time a Nottingham, Birmingham, or Liverpool accent became an acceptable 'stage voice'. Not all the plays were good, but some, like Shelagh Delaney's *A Taste of Honey* and Arnold Wesker's *Roots*, have thoroughly deserved their success.

But perhaps still more significant than the working-class plays or 'kitchen-sink dramas' has been the use made of the theatre for a different type of play – a so-called platform play. The traditional idea of a play being concerned with the interaction of stage characters, and their development in response to each other and the plot, is no longer a universal rule.

Not everyone likes the present theatrical trend to produce 'plays without a plot', but there is a very sound reason for it. The play is more and more becoming a platform for the author to air what can be called his social philosophy, rather than the simple story it has traditionally been. Playwrights like Harold Pinter, Samuel Beckett, and Eugene Ionesco can write a play in which, from the standpoint of a story, virtually nothing happens. They are using the theatre to get across their own particular message. In the case of Pinter, he believes, or seems to believe, that it is impossible for one individual to communicate really successfully with another, and for that reason his plays often consist of extraordinary, 'meaningless' dialogue for the simple reason that it is literally impossible for people really to understand each other.

The play that set the 'kitchen-sink' fashion – John Osborne's Look Back in Anger, *first produced at the Royal Court Theatre in* 1956



Samuel Beckett is depressed by man's futility. His theme can be summed up by the last words in his famous play *Waiting for Godot*, when one tramp says to the other 'Let's go', and the stage direction is *they do not move*. This is why nothing happens in Samuel Beckett's plays. They reflect life which is to him one long lack of progress.

Ionesco is a leading figure in the 'theatre of the absurd'. In his play *Jacques* he writes about a spineless young man completely dominated by his parents and obeying their every command. But he does make one assertion of independence – his marriage. He is not going to marry any girl unless she has three noses, and, of course, such a girl turns up. What are we to make of this? Has it any meaning? Perhaps an even more ridiculous play is *Rhinoceros*. All the characters turn into rhinoceroses and only Berenger holds out against the trend. Then he too succumbs and decides to change into a rhinoceros. Ionesco's point is, in fact, the rather unoriginal one of 'following the crowd'. We are products of our environment and can never be immune to influence. The individuality sought by both Jacques and Berenger is doomed to failure.

It is not only in the plays themselves but also in new ideas of presentation that the 20th century has proved extremely fertile. Shakespeare in modern dress has been a favourite scheme of modern producers. Shortly after the Second World War, Alec Guinness starred in a modern-dress production of *Hamlet*, while *Henry V*, in battledress, has recently been performed with outstanding success at the Mermaid Theatre. Other techniques include the revolving stage, which is in use at many theatres, including the Stratford Memorial Theatre; and theatre 'in the round', where the play is performed in the middle of the audience.

Acting techniques, too, have been developed, and 'method' acting is a popular modern trend, in which the actor acts the part as he feels it rather than with strict reference to the atmosphere of the lines. In practice the method actor is the opposite of a 'ham'. But carried to absurdity it caused one critic to write of a young method actor: 'I asked him to give me a demonstration. He did. "Oh what a rogue and peasant slave am I," he remarked casually as he reached across for another cream cake.'

The establishment of the National Theatre will, when it is completed, be of tremendous benefit to English drama. 'Experimental' plays will be able to be staged with less regard to profit and loss, and the funds at the disposal of its director will enable the best actors, designers, and producers to be engaged for major productions.